National Aeronautics and Space Administration

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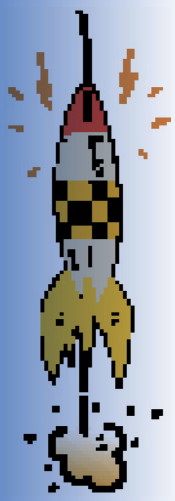
Going in Circles...



Space Nutrition

Blood is an important part of nutrition research – by analyzing different chemicals in blood we can learn a lot. Most people are familiar with the needle part of blood collection, but you might not know what happens after the blood is in the collection tube. Components of the blood are separated from one another so that researchers can conduct tests on different parts of the blood. Most often, the blood is allowed to clot, and the serum (a clear yellowish liquid) is separated from the solid components of blood, such as red and white blood cells. Serum contains water, proteins, vitamins, minerals, salts, sugars, and lipids. Serum is a good indicator of whether or not our body systems are receiving proper nutrition.

Scientists use a machine known as a centrifuge to separate the serum from the solid components of blood. A centrifuge is kind of like a carousel, but it is smaller (it fits on a lab bench) and much faster (it typically rotates about 3000 times per minute!). The centrifuge rotor holds test tubes of blood in little compartments and spins in circles really fast. When the centrifuge is finished, the solid components of the blood in the test tubes are separated from the serum, and scientists can then use the serum to perform various tests.

In July 2006, a refrigerated centrifuge was launched to the International Space Station (ISS). Having a centrifuge there makes it possible to separate blood cells and serum in space. Astronauts can collect blood samples and scientists can use these samples to see what happens to the human body in space.

On September 18, 2006, the Expedition 14 crew launched into space on board the Russian Soyuz rocket. The Soyuz docked with the ISS and the astronauts will be staying there for about 6 months. NASA astronaut Mike Lopez-Alegria is the commander of Expedition 14. During his time in space, Mike will draw his blood 5 times. After his blood is drawn and into test tubes, it will be centrifuged and frozen until it can be returned to Earth on the Shuttle. NASA scientists will use Mike's blood to examine the effects of space on nutrients (vitamins and minerals), bones, muscles, and other body systems.

The centrifuge in the ISS is relatively small (about 12 inches across); some centrifuges are much larger. In fact, NASA has one centrifuge here on Earth that is big enough to spin humans! This centrifuge is designed to create artificial gravity. The device spins people in a way that makes them feel like they are standing up while they are lying down. This will allow people to experience the effects of gravity even when there is none present, the way it is in space. Someday, a similar centrifuge may be sent into space so that we can "create" gravity for astronauts and reduce the negative effects of space on body systems.

Thea's Corner...

For this activity, use the clues below to find 8 hidden words in the box of letters (some words may be backwards!).

1. Testing our blood can tell us if our bodies are receiving proper _____.
2. Scientists often _____ different chemicals in the blood.
3. A centrifuge separates this from the solid components in blood.
4. The human centrifuge at NASA creates artifical _____.
5. Serum contains vitamins, water, sugars, salts, proteins, and lipids. What other nutrient is found in serum?
6. The Expedition 14 crew recently launched to the International Space _____.
7. What motion does a centrifuge spin in?
8. Testing astronauts' blood will help scientists understand the negative effects of space flight on muscles and _____.

a	b	i	l	r	p	e	n	o	n	t
g	m	a	q	s	e	r	u	m	v	p
f	r	n	e	l	g	f	t	i	n	a
b	s	a	b	n	c	r	r	n	y	h
o	k	l	v	o	s	p	i	e	a	d
n	q	y	s	i	v	h	t	r	t	m
e	i	z	n	t	t	k	i	a	o	f
s	m	e	x	a	n	y	o	l	b	x
b	d	r	w	t	j	t	n	s	p	o
f	a	b	q	s	e	l	c	r	i	c
j	e	n	c	a	n	d	g	l	w	t

Did You Know?

- Blood makes up about 10% of your body weight.
- A man by the name of Antonin Prandl invented the first centrifuge to separate cream from milk.
- Mike Lopez-Alegria will be the first astronaut to have his blood drawn, centrifuged, and stored on board the International Space Station.
- The International Space Station is only halfway built, but it can be seen from Earth with the naked eye! When it is complete, the International Space Station will be larger than a 5-bedroom house and will weigh nearly 1 million pounds!

Word of the Month

International

Can you guess what this word means? Look it up in the dictionary and see if you were right. We'll have more on this next month!

Web Connections: Did you know almost a quarter of a million pictures of Earth have been taken from the ISS? You can see some in the links below:

http://spaceflight.nasa.gov/gallery/images/station/
http://www.nasa.gov/audience/forkids/home/index.html
http://www.nasa.gov/mission_pages/station/main/index.html

Check out Thea's Bonus Page, experiments you can try, and even stuff you may have done at our website:
http://hacd.jsc.nasa.gov/resources/kid_zone.cfm
email: Space.Nutrition.Newsletter@nasa.gov